

What is a Camera & How do I use it?



Kent Messamore



Digital Photography

August 21

What is a Camera - We will look at all of the elements that make up a Camera.

How to operate your Camera (Please bring your camera (Cell Phone, Tablet, Point & Shoot, DLSR). If you have more than one camera, bring them both. For Cell Phones & Tablets, we will recommend specific Apps for taking photos. For the other Cameras we will show you how to improve your photos by getting you out of the habit of using "Auto" for taking all of your images; using Scene Modes and other settings on the dial.



September 18

Getting it right in the camera - Aperture, Shutter Speed, ISO, Exposure Compensation, White Balance, Flash.

What makes an outstanding photograph - Introduction to Composition. Depth of Field. Moving subjects, Telephoto, Macro.

Post Processing - Loading Images into your Computer. Metadata. Histograms. What is this thing Called "RAW"?



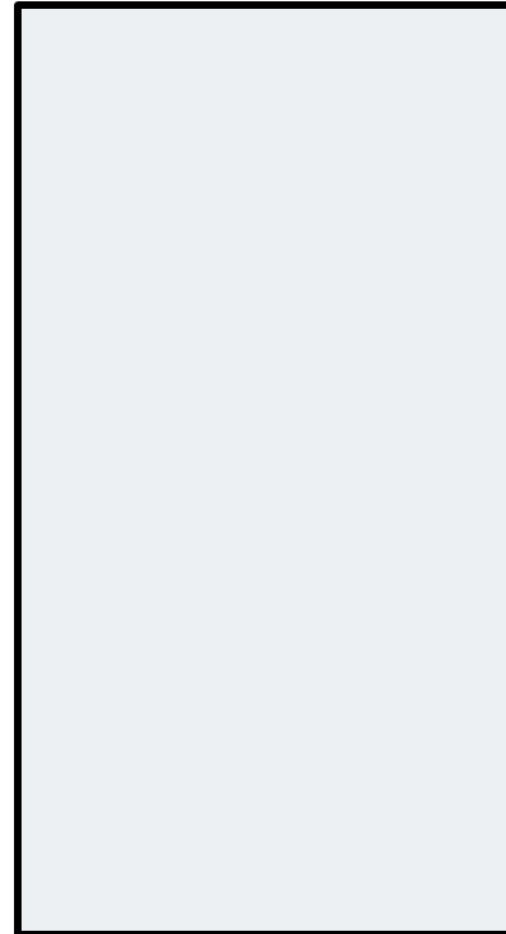
October 16

Common Image processing elements - Global adjustments, Selection tools, Layers, Blending & Opacity, Local Adjustments, Healing & Cloning, Masks.

Introduction to Photo Processing Applications - Lightroom, Photoshop, Photoshop Elements, Photoshop Touch. Snapseed

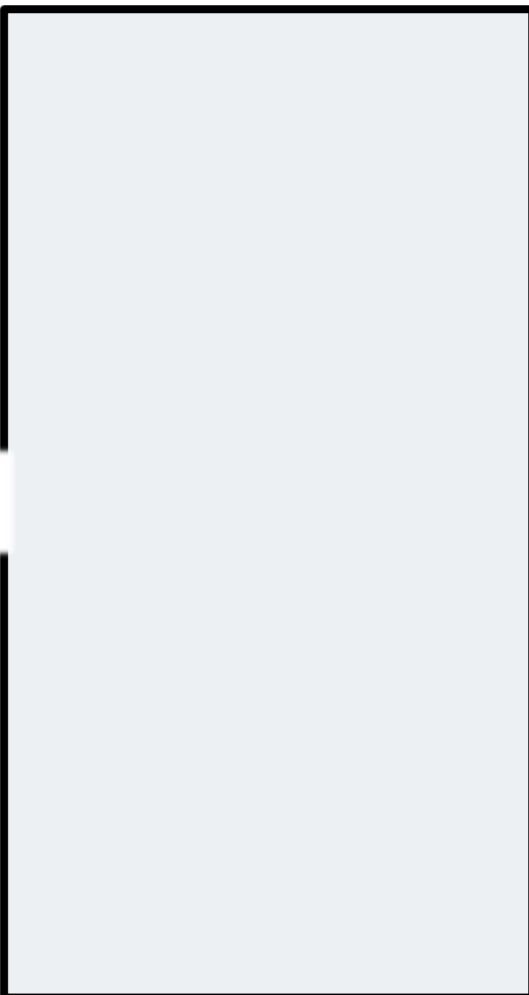
Let's Build a Camera

Let's Build a Camera



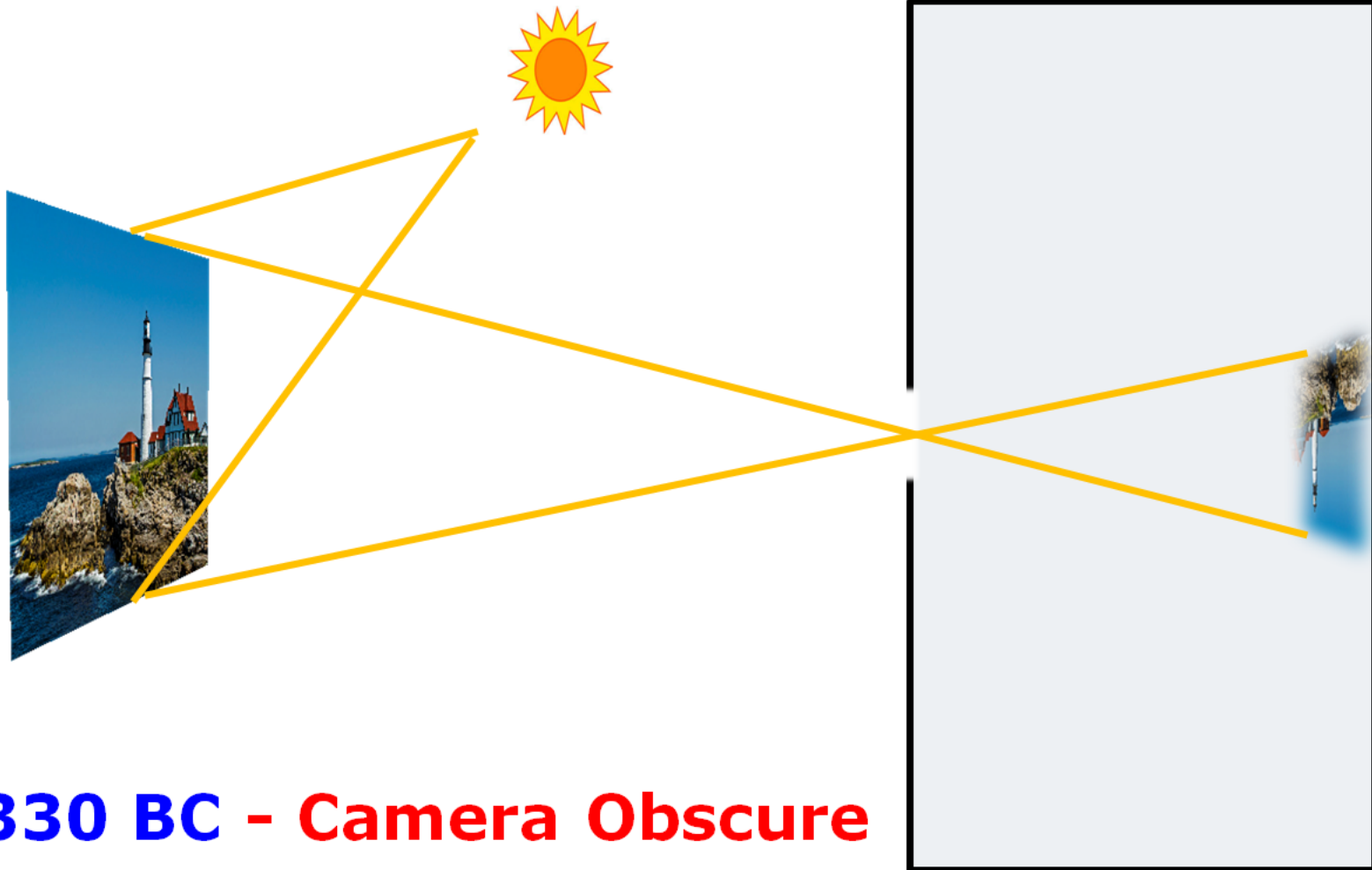
**Box
(Dark
Inside)**

There's our Camera



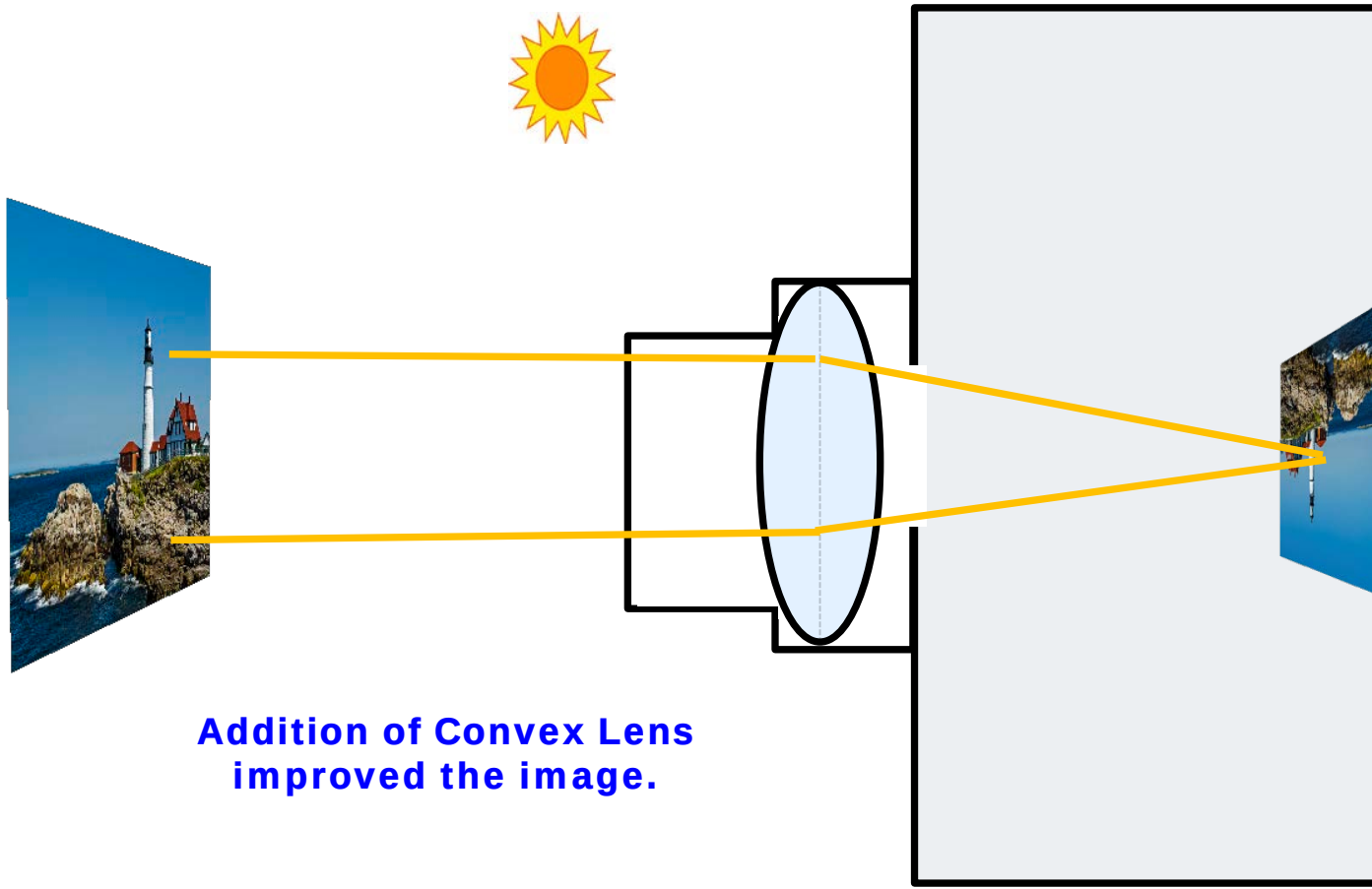
Hole

But how does it work?

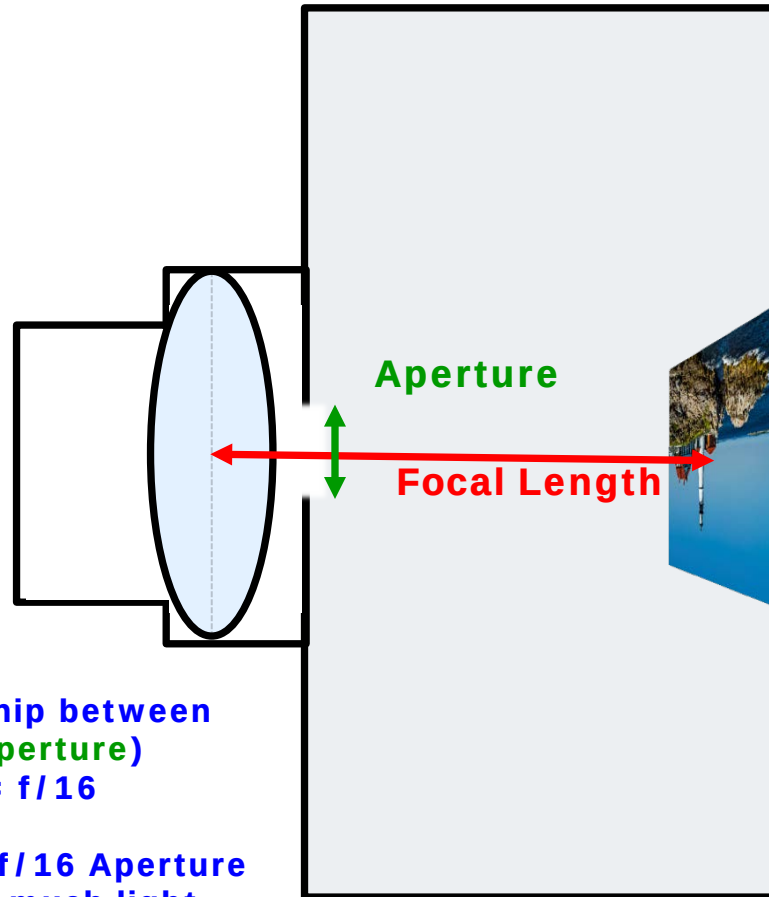


330 BC - Camera Obscure

Let's Build A Camera



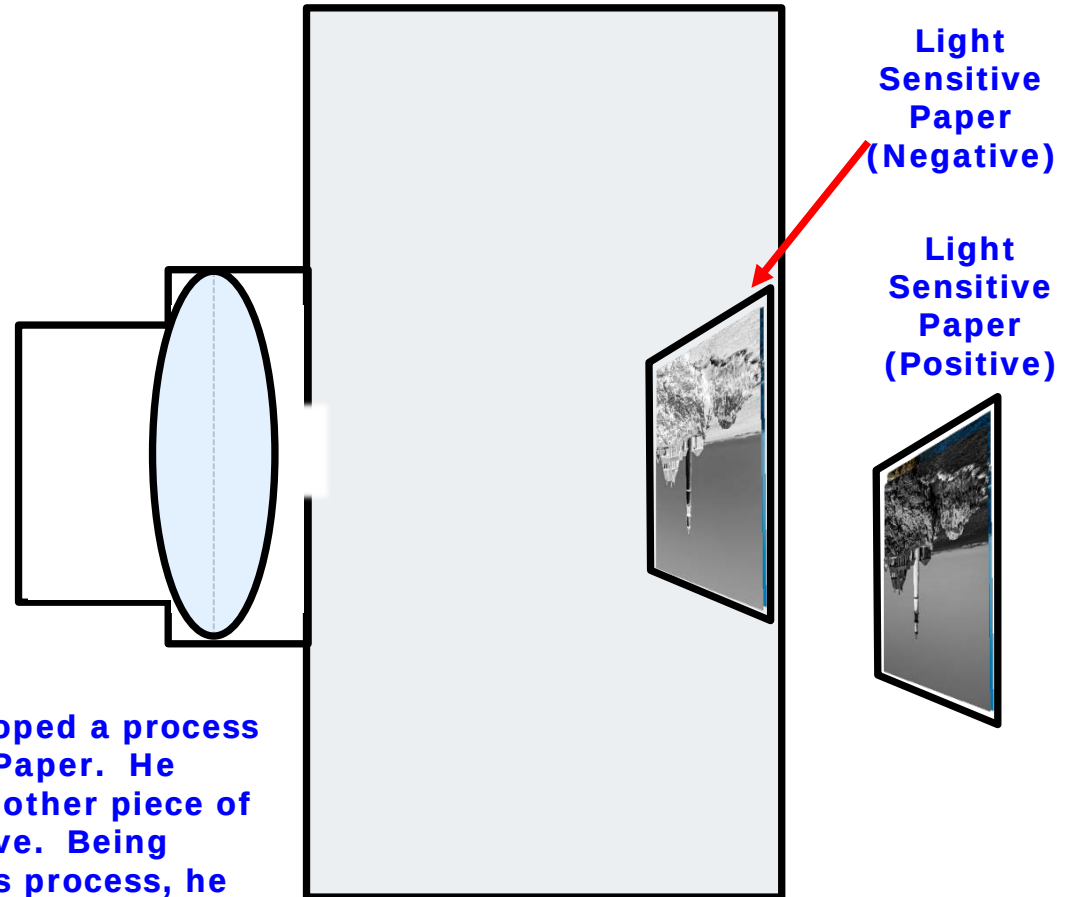
Let's Build A Camera



For sharp image there is a relationship between
Focal Length and Size of hole (**Aperture**)
Focal Length / Aperture = 16 = f/16

Early Camera Obscure devices used a f/16 Aperture
or a “slow lens” which didn't let in much light

Let's Build A Camera



1834 – An Englishman (Talbot) developed a process to capture images on Light Sensitive Paper. He could then place the Negative over another piece of Light Sensitive Paper to form a Positive. Being concerned about someone stealing his process, he did not publicize the process.

Let's Build A Camera

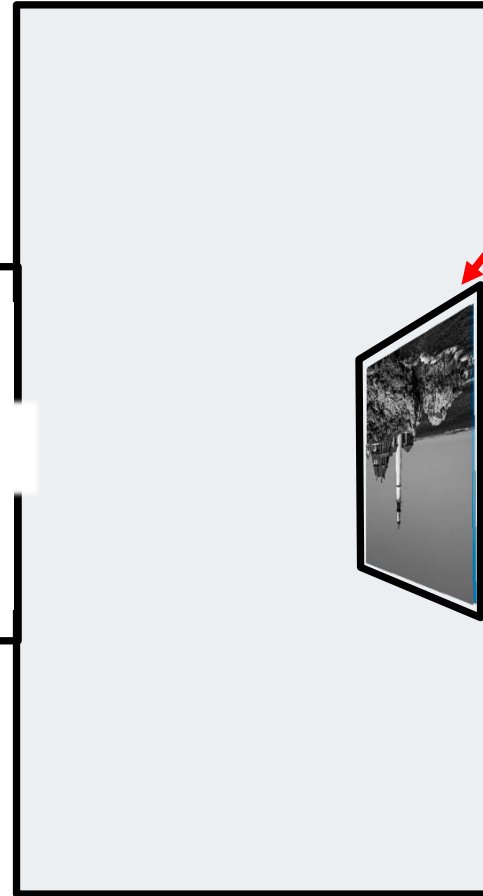
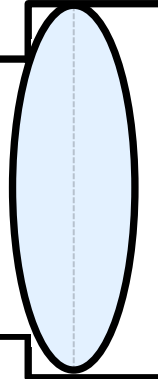
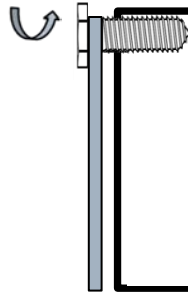


**First
Commercial
Camera**

**Shutter and size of hole determine
how much light reaches the plate
(Exposure)**



Shutter



**Light
Sensitive
Silver
Plate
(Positive)**



Daguerreotype

1839 – Frenchman (Louis Daguerre) developed a process to capture images on light sensitive Silver plate. He revealed process to the world. Exposure process was slow (several minutes), but Daguerreotype process exploded across the world.

Let's Build A Camera

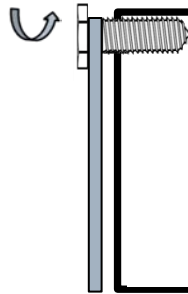


**First
Commercial
Camera**

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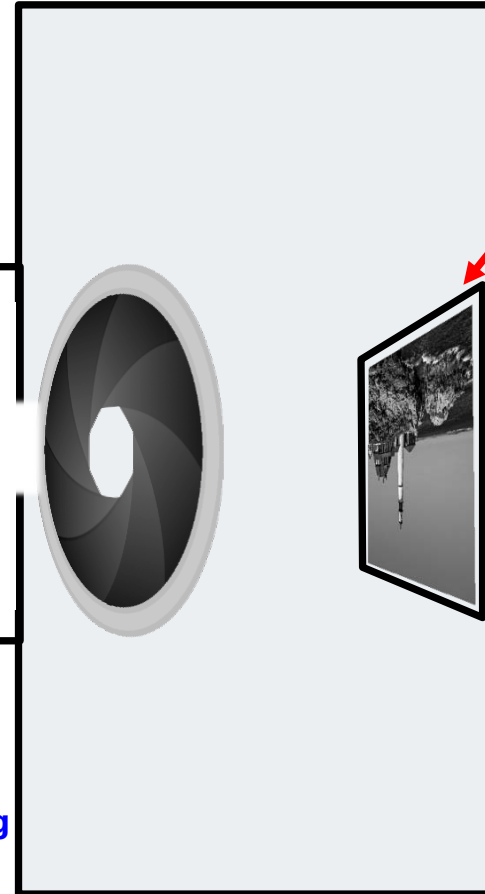


Shutter



1840 – Improvements in Lens (Petzval) 150 mm Focal Length and 42 mm opening = $f/3.6$.

1858 – Adjustable IRIS Diaphragm allows for controlling Area that is in focus (Depth of Field) – Harrison & Schnitzer.



**Light
Sensitive
Silver
Plate
(Positive)**



Daguerreotype

Let's Build A Camera

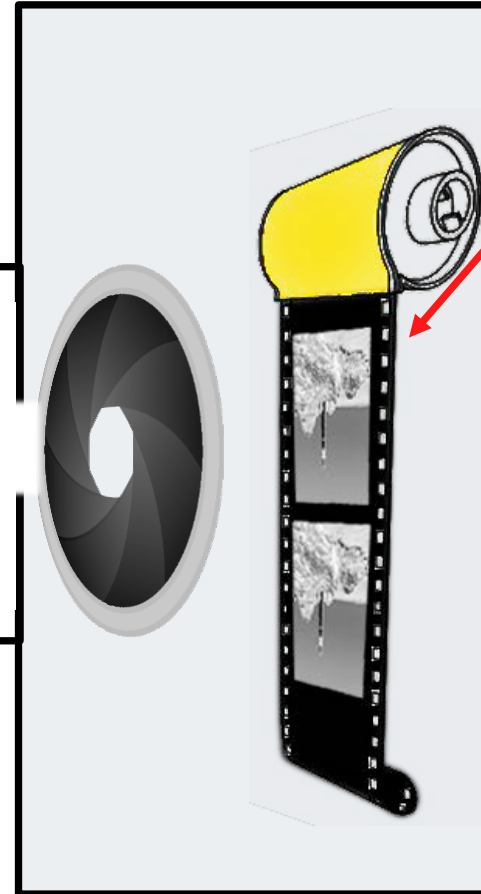
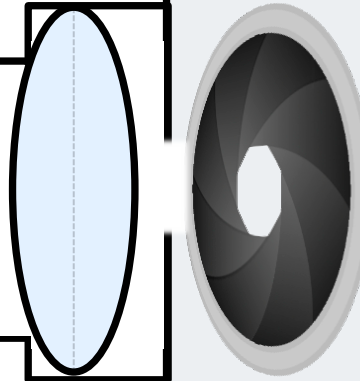
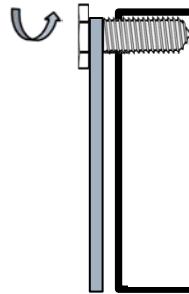


1884 – Roll Film (George Eastman - Kodak) using Talbot Process.

1888 – Kodak Camera – Roll Film, Mass produced Camera, Mail in Camera for Development, Camera returned with new Roll Film

1900 – Brownie Camera (\$1) targeted at Children

Shutter



Light Sensitive Roll Film (Negative)



Developed Film (Positive)

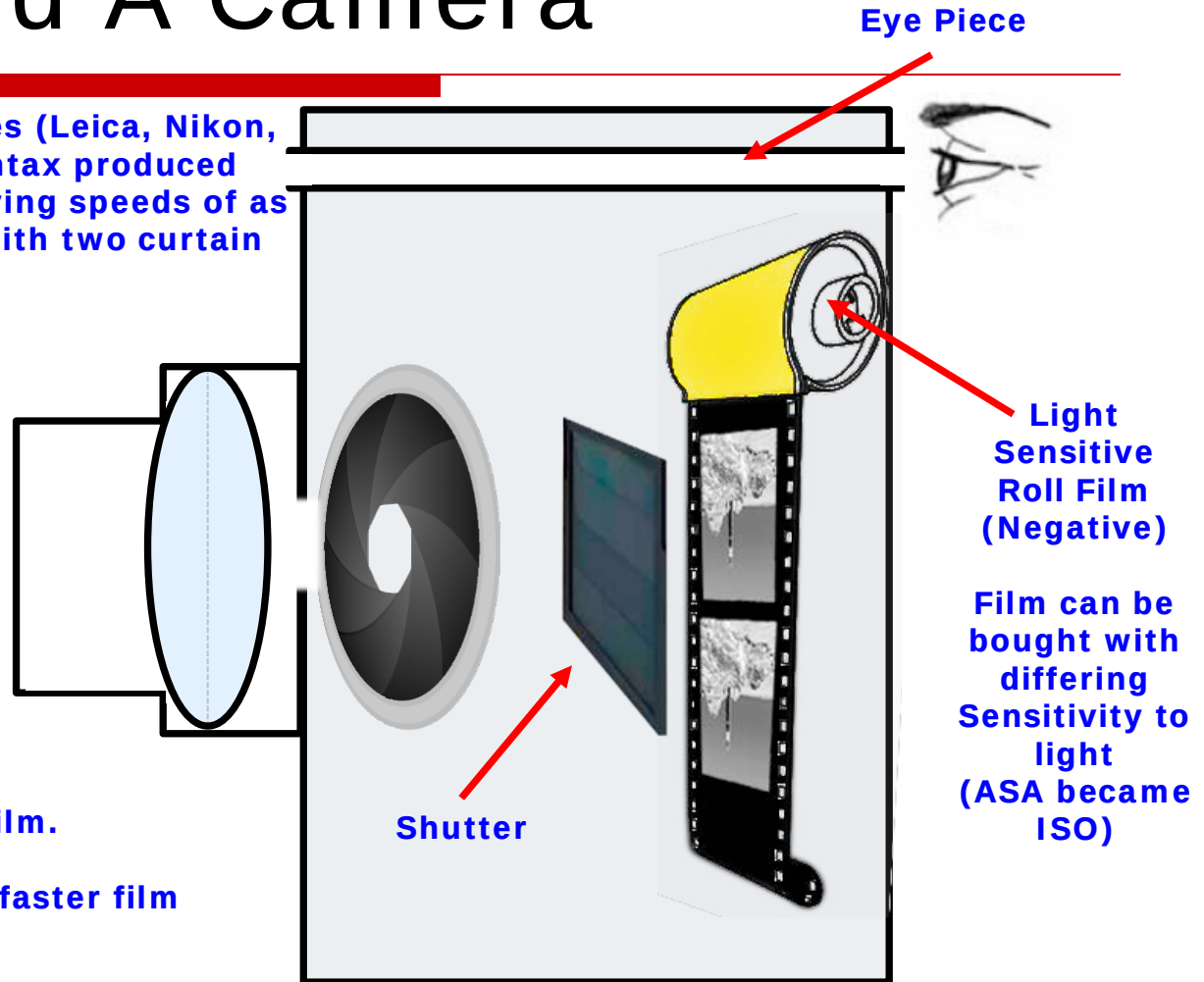
Let's Build A Camera

1925 – today - several companies (Leica, Nikon, Konica, Contax, Minolta, and Pentax) produced faster and faster shutters achieving speeds of as much as 1/8000 second today with two curtain shutters.

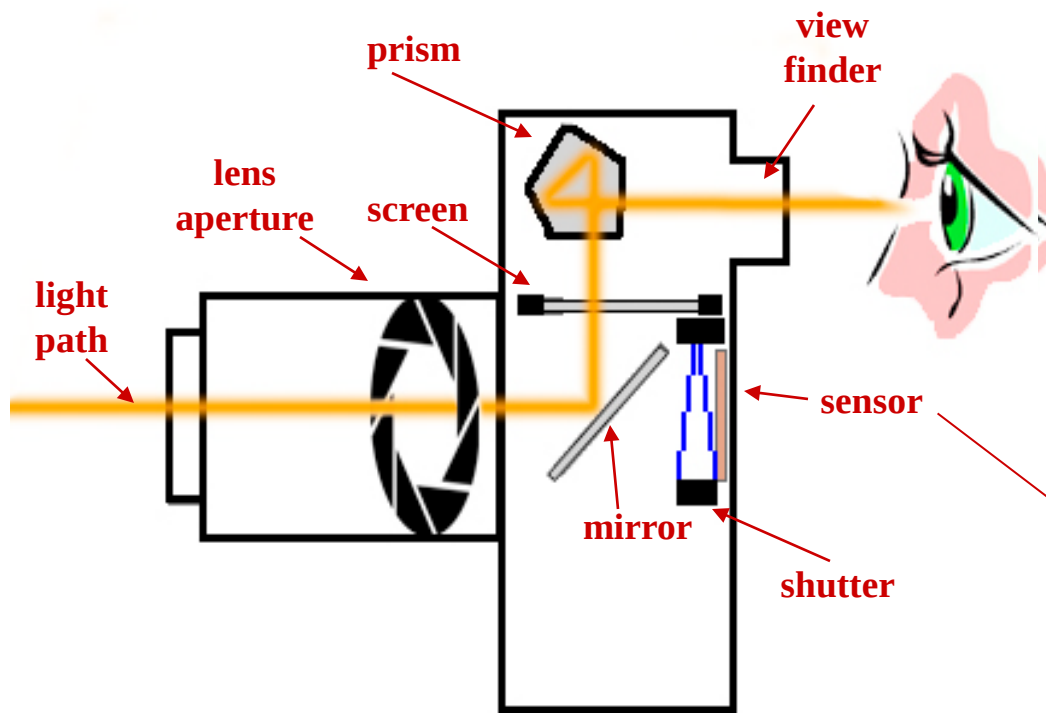


1935 – Kodak introduced color Film.

1943 to today - Kodak produced faster film sensitivity (ASA) now ISO.



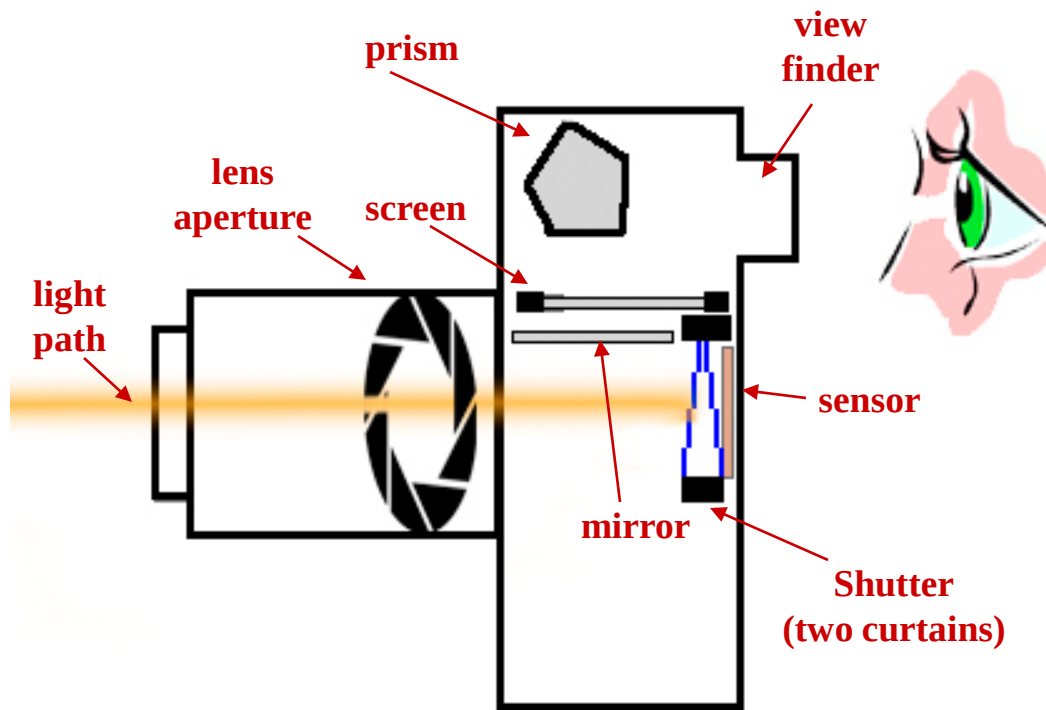
SLR Camera Firing Sequence



- ☐ Set Aperture (f/stop) and Shutter Speed
- ☐ Press Shutter Button Half Way
- ☐ Lens Aperture stops down
- ☐ Press Shutter Button full down
- ☐ Mirror pops up

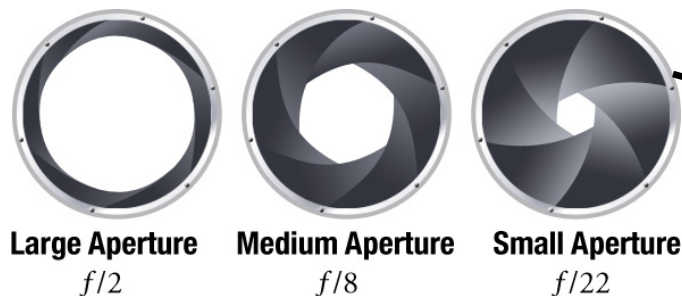
1975 – Steven Sasson an engineer at Eastman Kodak invented the digital sensor

SLR Camera Firing Sequence



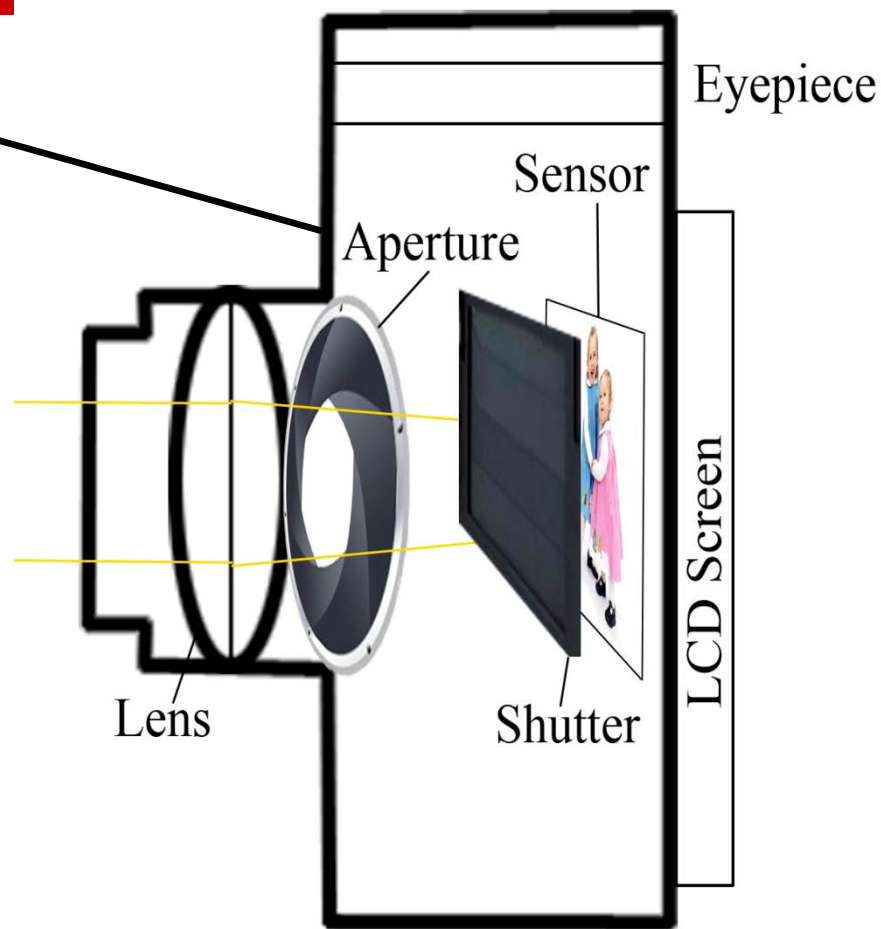
- ☐ Set Aperture (f/stop) and Shutter Speed
- ☐ Press Shutter Button Half Way
- ☐ Lens Aperture stops down
- ☐ Press Shutter Button full down
- ☐ Mirror pops up
- ☐ Rear Curtain opens
- ☐ Front curtain opens
 - Exposure begins
- ☐ Rear curtain closes
 - Exposure ends
- ☐ Front curtain closes
- ☐ Mirror drops down

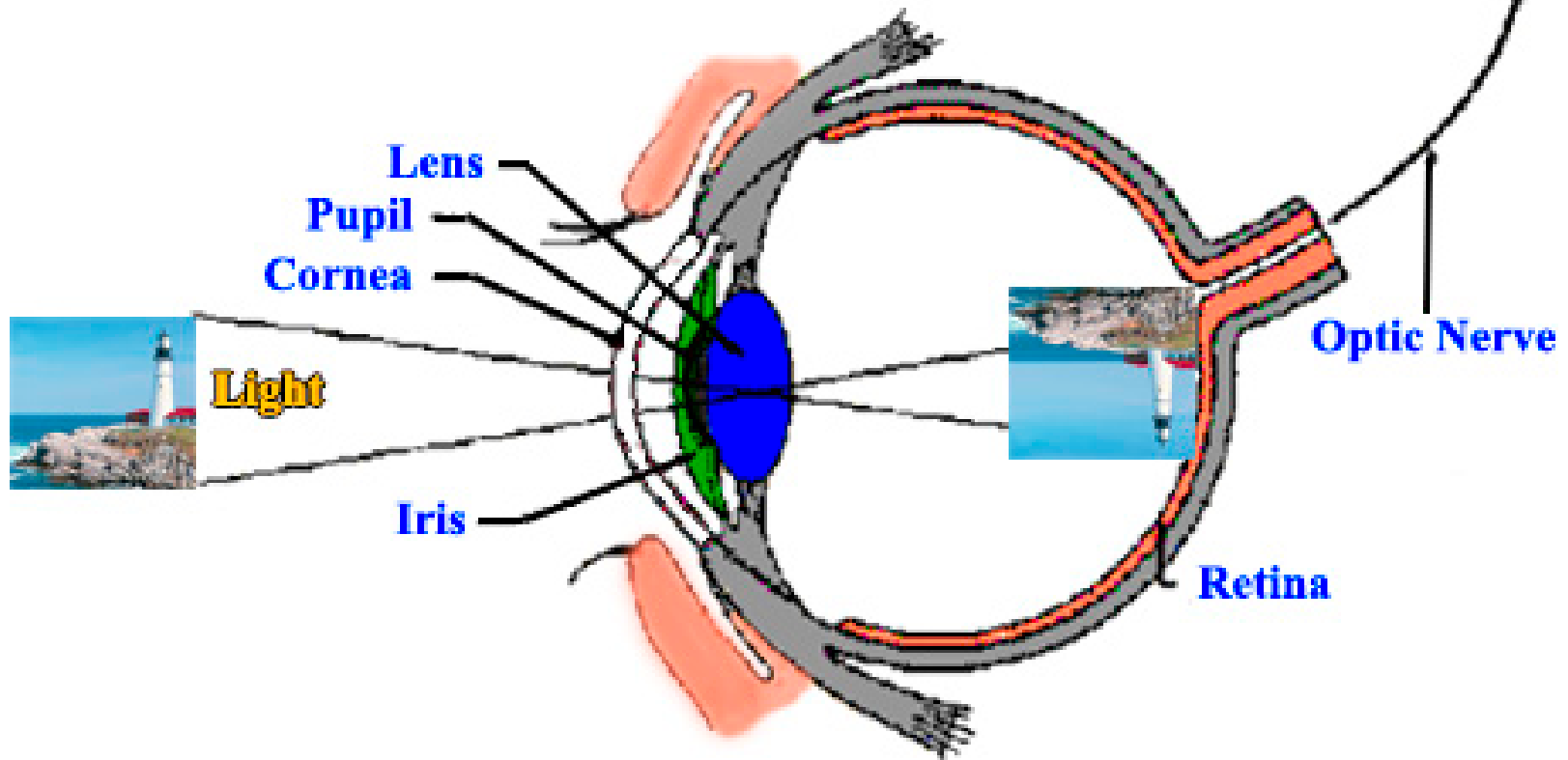
Exposure



The amount of light that hits the sensor (**Exposure**) is controlled by:

- the size of the **Aperture**
- How long the shutter is open (**shutter speed**)
- Another factor in Exposure is the sensitivity to light of the camera Sensor (**ISO**)





Quantity of Light

- ❑ Quantity of light is an absolute. It can be measured by your camera very accurately
- ❑ Quantity of light is called **Exposure**
- ❑ Exposure can be controlled either Automatically in your camera or Manually.
- ❑ **Accurate Exposure** makes the difference between a good photograph and a bad photograph



Exposure

- Quantity of Light or Exposure is controlled by three factors:

How sensitive to light is the sensor in your camera?

ISO



Quantity of Light

Aperture or f/stop

How wide is the lens opening in your camera?

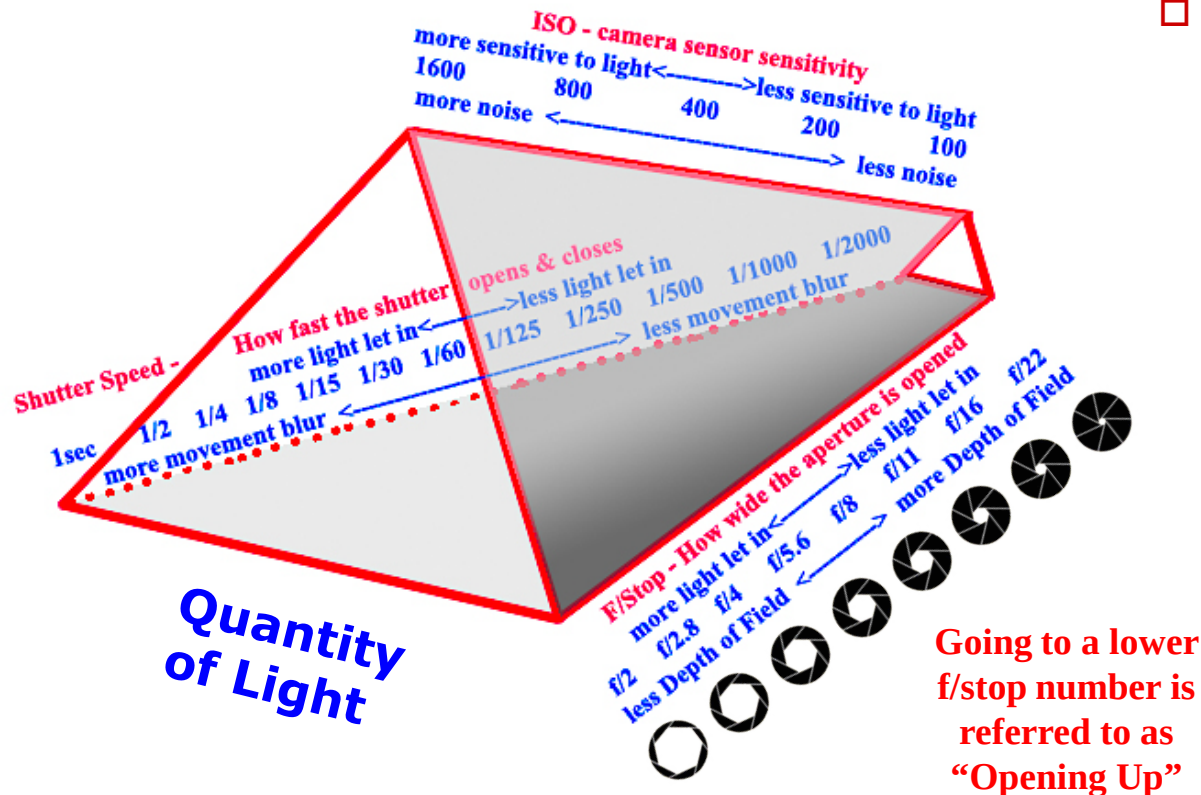


How fast does the shutter in your camera open and close

Shutter Speed

Accurate Exposure can be achieved by more than one selection of these three controls

Exposure



- Quantity of Light or Exposure is controlled by three factors:
 - **ISO** - How sensitive to light is the sensor in your camera? Higher ISO creates more noise in your photo
 - **Aperture or f/stop** - How wide is the lens opening in your camera? Higher f/stops yield increased Depth of Field
 - **Shutter Speed** - How fast does the shutter in your camera open and close. Slow Shutter Speeds cause movement blur in your photos. Fast shutter speed stops action.

Each Step in this diagram represents "One Stop".
Most cameras allow for $\frac{1}{2}$ or $\frac{1}{3}$ stop increments

Your Lens (Focal Length) Eye is 50 mm



24 mm

Wide Angle

**Can you see
the flag on
Manchester
City Hall?**

Your Lens (Focal Length) Eye is 50 mm



50 mm

Telephoto

**Can you see
the flag on
Manchester
City Hall?**

Your Lens (Focal Length) Eye is 50 mm



75 mm

Telephoto

**Can you see
the flag on
Manchester
City Hall?**

Your Lens (Focal Length) Eye is 50 mm



150 mm

Telephoto

**Can you see
the flag on
Manchester
City Hall?**

Your Lens (Focal Length) Eye is 50 mm



300 mm

Telephoto

**Can you see
the flag on
Manchester
City Hall?**

Your Lens (Focal Length) Eye is 50 mm



600 mm

**Super
Telephoto**

**Can you see
the flag on
Manchester
City Hall?**

Your Lens (Prime vs. Zoom)

□ Prime

- Prime Lens has fixed Focal Length
- To change size of subject, Zoom with your feet
- Lighter & less expensive
- May be higher quality due to fewer parts.

□ Zoom

- Variable Focal Length
- To change size of image, “Zoom” the Lens
- Most common lens today
- Quality versus Prime lenses has dramatically improved



Your Lens (Minimum Focal Length)

□ Minimum Focal Length

- Minimum distance from subject to sensor that you can get and still be able to focus
- Any closer and photo will be blurred

□ Working Distance

- Minimum distance from subject to front of lens that you can get and still be able to focus
- Any closer and photo will be blurred

Sensor Plane Mark on camera



**Be aware of your
Working Distance**

Image Stabilization

- ❑ Common cause of blurry pictures is *camera shake*.
- ❑ The longer the exposure time, the longer you have to hold the camera still to avoid blur.
- ❑ Camera shake is greater problem with telephoto lenses.
- ❑ *Image Stabilization* (Canon - IS), *Vibration Reduction* (Nikon - VR), *Steady Shot* (Sony), can enable sharper shots when you handhold camera.
- ❑ Steadies image by fast spinning gyroscope, which compensates for vibration.
- ❑ Can be implemented in either the Camera or the lens.
 - In Camera offers stabilization no matter what lens you have attached
 - In lens tailors required amount of stabilization to the specific lens.
- ❑ **Can gain two stops hand held.**

Types of Cameras

☐ Cell Phone



Tablet



☐ Compact (Point & Shoot)



☐ Midrange (Bridge)



☐ Single Lens Reflex (SLR)



Cell Phones & Tablets

- ❑ Small lens/sensor lets in little light.
- ❑ To get good exposure need slow shutter
- ❑ Slow shutter + movement means blurred image
- ❑ Movement could be subject or **Camera Shake**
- ❑ Prevent Camera Shake with Tripod



Joby GorillaPod



Remote
Shutter Release



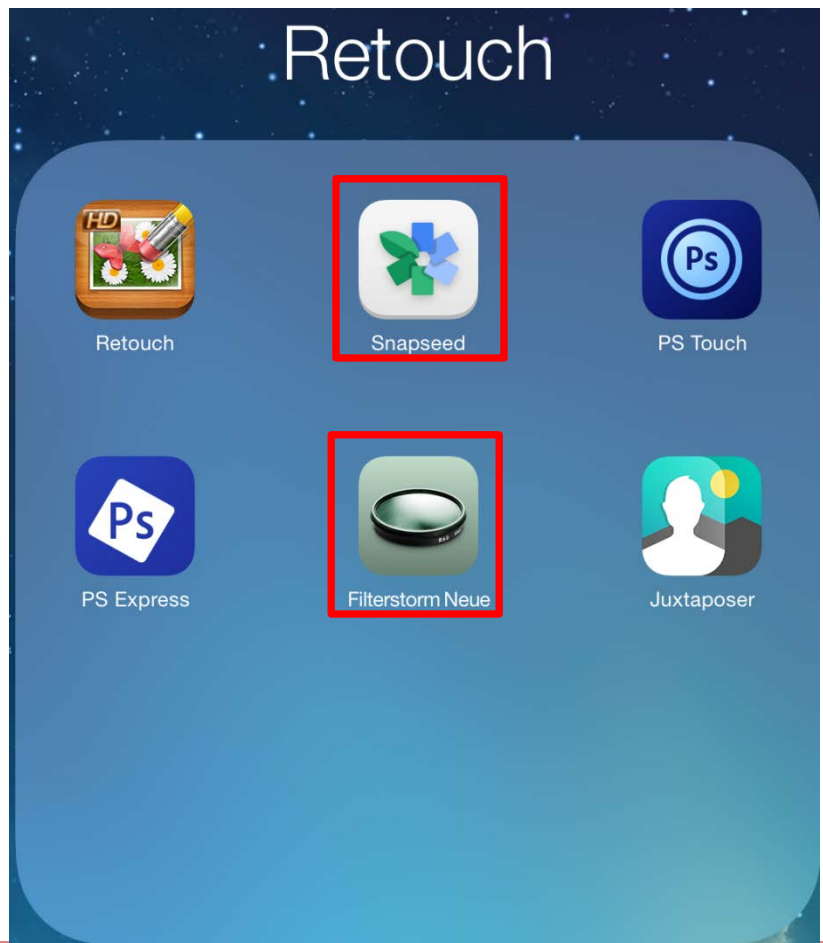
MeFoTo
Sidekick360



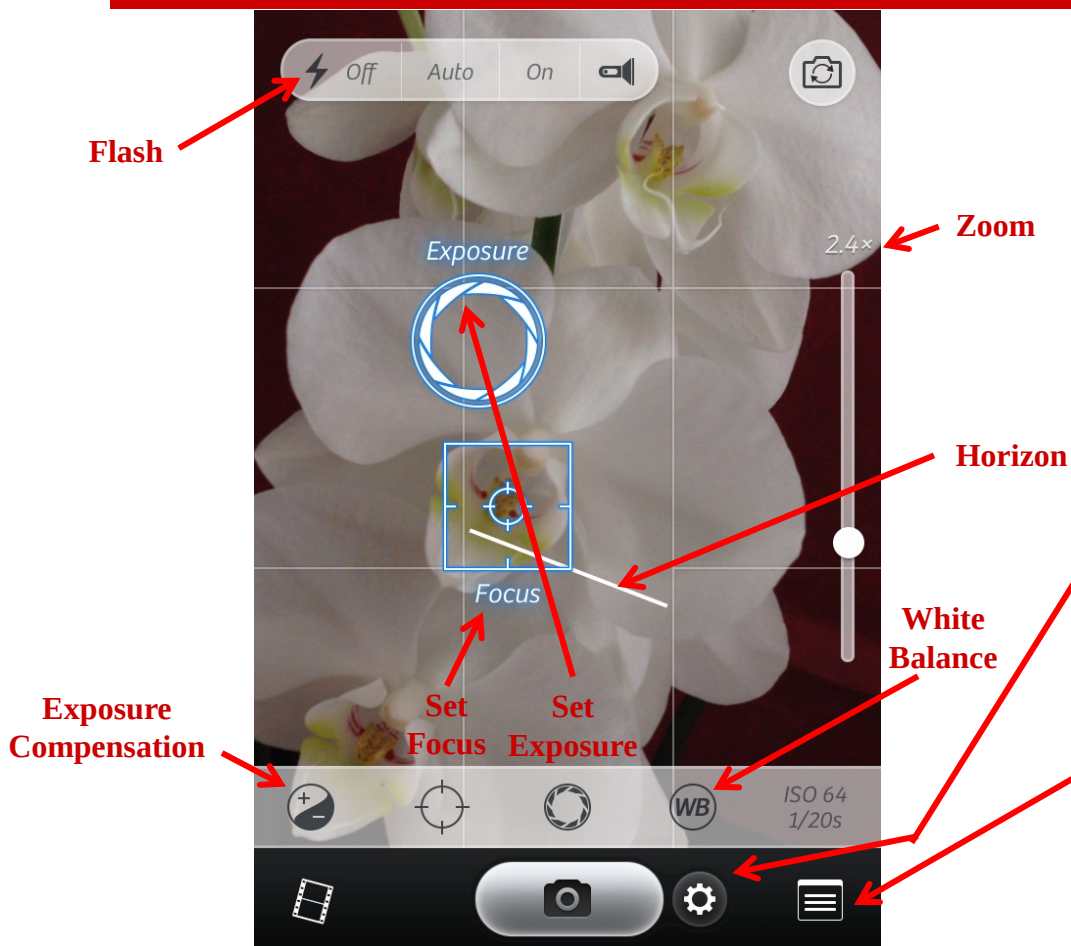
MeFoTo
Walkabout



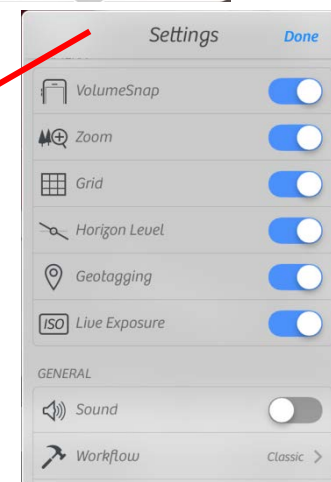
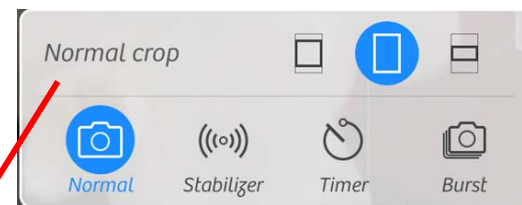
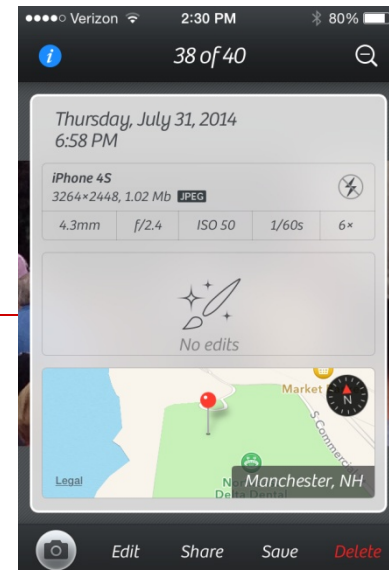
There are a lot of great Camera Apps



Camera +



Metadata



Operating camera for first time

- ☐ Read your manual
- ☐ Batteries – Make sure it's charged.
- ☐ Memory card – Make sure you have room.
- ☐ Don't open battery compartment or memory compartment when on.
- ☐ Date & Time.
- ☐ Tripod socket.
- ☐ Shutter button – two stages.
- ☐ Take a lot of shots of a scene, changing positions, distances, angles, settings.
- ☐ When through shooting turn camera off.

Exposure Modes (Dial Settings)



Scene Modes — Most P&S Cameras have a Scene Modes that allow user some ability to control image. What Scene modes do you have?

- Portrait – Blurs background to bring out subject.



Portrait - Blur background

- Infinity or Landscape – Shows detail in foreground & background



- Night – Take pictures in low light



Night shots - Open Aperture Slow Shutter Speed

- Sports or Kids & Pets – increased shutter speed to freeze action



Sports, kids moving around - Fast Shutter Speed

- Macro – for close ups



Other Scene Modes

- ☐ Sunsets
- ☐ Foliage
- ☐ Snow
- ☐ Beach
- ☐ Fireworks
- ☐ Aquarium
- ☐ Indoors

Shooting - Auto Mode

- All P&S Cameras have Auto Mode that sets focus & Exposure Automatically. User has no control. Select Auto Mode on your camera.

- ☐ Hold Camera as if you were a tripod – minimize camera shake
- ☐ **Frame** the Image – **Compose** in view finder
- ☐ **Zoom** the Lens – Zoom in and out to bring subject closer or further away
- ☐ Auto-**focus** – press **shutter button halfway** down
 - Are you too close?
 - Is it too dark to focus
- ☐ Auto-**exposure** – Camera adjusts aperture & shutter for correct amount of light onto the sensor
- ☐ Auto-**flash** – Flash will automatically fire in low light situations. What is the indication that Flash will fire? Red Eye Reduction?
- ☐ Auto-**White balance** – adjusts for color of light, e.g. sunny day, cloudy day, florescent lamp, tungsten lamp
- ☐ Press **shutter button fully down** to take photo

Take some Photos

Managing images on your camera

- ☐ How do you play back your images?
- ☐ Can you Digitally zoom in/out on an image?
- ☐ Can you display multiple images?
- ☐ Can you “Jump” images?
- ☐ How do you erase an image?
- ☐ Play back some images
- ☐ Delete some images
- ☐ Can you display a Histogram?



Histogram



Jump

Formatting Memory Card

- ☐ How do you erase all of the images on your memory card
- ☐ If you format your card by mistake, the images are still on the card. Formatting only eliminates the directory
- ☐ Computer recovery software can scan the card and recover most images
- ☐ Caution – when throwing away a memory card, you should be aware there may be images on it.

Shooting - Program Mode

- ❑ For Point & Shoot Cameras, this is the most common setting.
- ❑ Most P&S Cameras have a Program Mode that allows user some ability to control image.
- ❑ Camera still makes most of the decisions but usually allows:
 - **Setting ISO**, i.e. the Sensitivity of the sensor to light, allowing shoots in low light situations
 - **White Balance** - adjusts for color of light, e.g. sunny day, cloudy day, florescent lamp, tungsten lamp
 - **Control of Flash**

Camera Controls – Program Mode

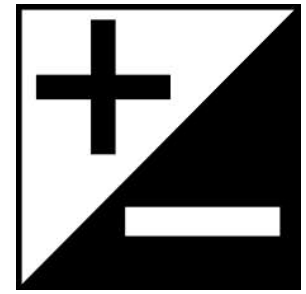
- ☐ How do you Zoom your camera lens?
- ☐ How do you turn flash on?  Off? 
- ☐ How do you set ISO?
- ☐ How do you set White Balance?

Take some photos indoors

Camera Controls – Scene Modes

- ☐ What Scene Modes does your Camera have? What are the differences between them?
- ☐ How do you select them?

Take some photos indoors



Exposure Compensation

- ☐ Photos taken in Automatic Exposure Modes have exposure calculated by the camera
- ☐ Camera doesn't always get it right
- ☐ Most cameras have “Exposure Compensation” that allows manual over-ride of the camera exposure value by a + or – factor

How do you select Exposure Compensation?

Take some photos indoors

Downloading images to a computer

- ☐ Connect directly to your computer via USB port – Consult your Camera User Manual
- ☐ Connect through a memory card reader which plugs into a USB Port
- ☐ Usually what ever software you have can be set up to automatically open to extract images whenever you insert a memory card.



Download some images to your computer.

Where did you put them? Can you see them on your monitor?

Metadata

- Whenever you take a photo with your camera, the camera records a great deal of information about the photo.

- PC - Access this data by opening the photo in Microsoft Photo Viewer and going to File -> Properties
- Cell Phone/iPad App – Exif Wizard
- Mac – Click on photo icon, press command-I, to bring up info dialog, click right facing “more info” triangle

CRW_3635.jpg Properties

General | Security | Details | Previous Versions

Type of file: JPEG image (.jpg)

Opens with: Windows Photo Viewer

Location: C:\Users\Kent Messamore\Desktop

Size: 5.24 MB (5,498,536 bytes)

Size on disk: 5.24 MB (5,500,928 bytes)

Created: Today, August 13, 2010, 5 minutes ago

Modified: Today, August 13, 2010, 5 minutes ago

Accessed: Today, August 13, 2010, 5 minutes ago

Attributes: ☐ Read-only ☐ Hidden

CRW_3635.jpg Properties

General | Security | Details | Previous Versions

Property	Value
Origin	
Authors	Kent Messamore
Date taken	6/27/2004 6:05 AM
Program name	Adobe Photoshop Lightroom
Date acquired	
Copyright	Enhanced Images
Image	
Image ID	
Dimensions	2048 x 3072
Width	2048 pixels
Height	3072 pixels
Horizontal resolution	100 dpi
Vertical resolution	100 dpi
Bit depth	24
Compression	
Resolution unit	
Color representation	

Image Size

CRW_3635.jpg Properties

General | Security | Details | Previous Versions

Property	Value
Camera	
Camera maker	Canon
Camera model	Canon EOS D60
F-stop	f/11
Exposure time	1/180 sec.
ISO speed	ISO-400
Exposure bias	0 step
Focal length	57 mm
Max aperture	4.34375
Metering mode	Center Weighted Average
Subject distance	
Flash mode	No flash
Flash energy	
35mm focal length	
Advanced photo	
Lens maker	
Lens model	

Image f/stop, Shutter Speed, & ISO

Getting Prints from your Images

Retail Store	4 x 6 Print	8 x 10 Print
Walmart	\$.19	\$2.84
Walgreens	\$.19	\$3.99
Fedex (Kinkos)	\$.39	
CVS	\$.19	\$3.99
Costco	\$.13	

On Line Store	4 x 6 Print	8 x 10 Print
Shutterfly	\$.15 + \$1.79	\$3.99 + \$1.79
Snapfish	\$.09 + SH	\$2.99 + SH
MPIX	\$.29 + SH	\$1.99 + SH

Printing your Images yourself

- ❑ Epson has been major player in photo printer marketplace for over ten Years.
- ❑ HP and Canon have been major players in Business printer market.
- ❑ HP and Canon have improved technology on high end printers to catch up with Epson.

Aperture Priority

□ Aperture-priority autoexposure:

- You specify aperture, or f-stop; camera selects the shutter speed needed to produce a good exposure.
- Control over aperture is important as setting affects *depth of field*, or distance over which objects in scene appear in sharp focus.
- If you're shooting portrait, for example, you can select an aperture that keeps the subject sharp while blurring the background.

□ This mode typically is Av or A

Does your Camera have Aperture Priority?

Shutter Priority

- ❑ **Shutter-priority autoexposure:**
 - you select shutter speed; camera selects aperture needed to expose the picture properly.
 - Since shutter speed determines whether moving objects appear blurry or “frozen” in place, gaining control over this exposure setting is especially important if you shoot action pictures.
- ❑ Shutter-priority mode is usually labeled S or Tv (*time value*) on the camera’s exposure dial.

Does your Camera have Shutter Priority?

Manual shooting — With a point & shoot camera, Manual shooting is cumbersome at best.

□ Manual exposure:

- You specify both aperture and shutter speed to precisely control exposure.
- Most cameras display an exposure meter that lets you know whether your picture will be properly exposed

Does your Camera have Manual Exposure?

What is the Aperture or f/stop range?

What is the Shutter Speed range?

Shutter Release Mode

- **Shutter-release mode:** Many cameras offer choice of shutter-release modes, which controls what happens when you press the shutter button. Common modes include:
 - ***One-shot or single mode:*** Camera records one image every time you fully depress the shutter button. In other words, this is normal photography mode.
 - ***Continuous or burst mode:*** Press and hold shutter button down to record continuous series of images at a rapid pace. The camera keeps recording pictures until you let up on the shutter button.
 - ***Self-timer mode:*** Press and release the shutter button, and image is captured several seconds later. (This is the mode you use when you want to put yourself in the picture.)
 - ***Remote-control mode:*** Some cameras enable you to trigger the shutter button with a remote control unit; if so, this mode sets up the camera for that option.
- Option that controls the shutter-release mode varies; it may be named Drive mode, Release mode, or Shooting mode.

Before taking a shot, ask yourself:

- ☐ What is the story I am telling?
- ☐ What do you want viewers eyes to see?
- ☐ Are there any distracting objects that I should exclude from the image.
- ☐ Is anything in the scene moving?
- ☐ What is in the background of the shot?
- ☐ Are you close enough? Are you too close?
- ☐ What is the main source of light?
- ☐ Should I move to another position?
- ☐ Should I shoot Portrait or Landscape?
- ☐ How will the eye travel through this image?